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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,912	09/14/2006	Marwan Charara	21.1135	1928

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EXAMINER	
WEST, JEFFREY R	
ART UNIT	PAPER NUMBER
2857	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,912	CHARARA ET AL.	
	Examiner	Art Unit	
	Jeffrey R. West	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 September 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Drawings

2. The drawings in Figures 1, 4, and 5 are objected to because they do not have sufficiently descriptive labels, specifically, blank boxes in drawings should be labeled descriptively unless it is a well-known component.

Claim Objections

3. Claim 6 is objected to because of the following informalities:

In claim 6, line 2, to avoid problems of antecedent basis, “the propagating” should be ---propagating---.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 3, 6, 7, 9, 11, 12, 14, 16, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,470,275 to Dubinsky (incorporating by reference U.S. Patent No. 5,001,675 to Woodward).

MPEP §2163.07(b) [R-3]: Incorporation by Reference: Instead of repeating some information contained in another document, an application may attempt to incorporate the content of another document or part thereof by reference to the document in the text of the specification. The information incorporated is as much a part of the application as filed as if the text was repeated in the application, and should be treated as part of the text of the application as filed.

With respect to claim 1, Dubinsky discloses a method for characterizing a formation with a logging tool positioned within a borehole surrounded by the formation (column 4, lines 29-42, column 4, line 65 to column 5, line 24, and column 5, lines 59-65) the method comprising: exciting with the logging tool the formation with an acoustic wave propagating into the formation (column 6, lines 36-47); measuring a seismo-electromagnetic signal produced by the acoustic wave within the formation (column 6, lines 36-47); exciting the formation with an electromagnetic exciting field (column 6, lines 5-15); measuring an electromagneto-seismic signal produced by the electromagnetic exciting field within the formation (column 6, lines

5-15); analyzing the measured seismo-electromagnetic signal and the measured electromagneto- seismic signal to evaluate characterizing parameters of the formation (column 6, lines 15-18 and 45-52).

With respect to claim 3, Dubinsky discloses measuring an acoustic response signal, the acoustic response signal being produced by the acoustic exciting; estimating acoustic properties of the formation from the acoustic response signal (column 6, lines 36-52); measuring an electromagnetic response signal, the electromagnetic response signal being produced by the electromagnetic exciting; estimating electromagnetic properties of the formation from the electromagnetic response signal (column 6, lines 5-18).

With respect to claim 6, Dubinsky discloses that the analyzing takes into consideration the propagating of the acoustic wave within the formation (column 3, lines 28-33, column 6, lines 10-18, and column 6, line 64 to column 7, line 8).

With respect to claim 7, Dubinsky discloses that the seismo- electromagnetic signal is a seismo-electric signal (i.e. measured using a hydrophone) (column 6, lines 35-48).

With respect to claim 9, Dubinsky discloses that the electromagneto- seismic signal is a magneto-seismic signal (column 6, lines 5-15 – see also Woodward; column 1, lines 14-27 and column 3, line 64 to column 4, line 12).

With respect to claim 11, Dubinsky discloses displacing the logging tool along the borehole so as to provide a continuous characterizing of the formation as a function of depth (column 1, lines 9-18 and column 3, lines 22-27).

With respect to claim 12, Dubinsky discloses a system for characterizing a formation surrounding a borehole (column 4, lines 29-42, column 4, line 65 to column 5, line 24, and column 5, lines 59-65), the system comprising: a logging tool to be lowered into the borehole (column 1, lines 9-18 and column 4, line 59 to column 5, line 23); an acoustic emitter located onto the logging tool (column 6, lines 40-44 and Figure 2), the acoustic emitter allowing to excite the formation with an acoustic wave propagating within the formation (column 6, lines 36-47); an electromagnetic receiver to measure a seismo-electromagnetic signal produced by the acoustic wave within the formation (column 6, lines 5-15); an electromagnetic emitter located onto the logging tool (column 6, lines 8-12 and Figure 1), the electromagnetic emitter allowing to excite the formation with an electromagnetic exciting field (column 6, lines 5-15); an acoustic receiver to measure a electromagneto-seismic signal produced by the electromagnetic exciting field within the formation (column 6, lines 36-47); processing means to analyze the measured seismo-electromagnetic signal and the measured electromagneto-seismic signal so as to evaluate characterizing parameters of the formation (column 6, lines 15-18 and 45-52).

With respect to claim 14, Dubinsky discloses that the electromagnetic receiver is a magnetic receiver allowing to measure a seismo-magnetic signal produced by the acoustic wave within the formation (column 6, lines 5-15 – see also Woodward; column 1, lines 14-27 and column 3, line 64 to column 4, line 12).

With respect to claim 16, Dubinsky discloses that the electromagnetic emitter is a magnetic emitter allowing excite the formation with a magnetic exciting field (column 6, lines 5-15 – see also Woodward; column 1, lines 14-27 and column 3, line 64 to column 4, line 12).

With respect to claim 17, Dubinsky discloses at least one additional electromagnetic receiver (column 6, lines 8-12 and Figure 1); at least one additional acoustic receiver (column 6, lines 40-44 and Figure 2).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky in view of U.S. Patent No. 5,809,458 to Tamarchenko.

As noted above, the invention of Dubinsky teaches many of the features of the claimed invention and while Dubinsky does teach characterizing a formation with a logging tool based on actual and simulated seismo-electromagnetic and electromagneto-seismic signals (Dubinsky; column 6, lines 5-15 and 36-17 and column 9, lines 33-66), Dubinsky does not explicitly include means for generating a synthesized signal based on inversion parameters.

Tamarchenko teaches a method for simulating the response of a through-casing electrical resistivity well logging instrument and its application to determining resistivity of earth formations comprising selecting initial values of inversion parameters (column 8, lines 13-18 and column 9, lines 20-31); synthesizing a synthesis electric signal (column 3, line 47 to column 4, line 5) using the initial values of the inversion parameters (column 8, lines 44-48); calculating a difference between the synthesis electric signal and the measured electric signal (column 9, lines 6-12), adjusting the values of the inversion parameters according to the difference (column 9, lines 12-14); repeating the synthesizing using the adjusted values of the inversion parameters, the calculating of the difference, and the adjusting until the difference drops below a predetermined threshold (column 9, lines 14-20).

It would have been obvious to one having ordinary skill in the art to modify the invention of Dubinsky to explicitly include means for generating a synthesized signal based on inversion parameters, as taught by Tamarchenko, because, as suggested by Tamarchenko, the combination would have improved the system of Dubinsky by simulating a response of the well logging tool of Dubinsky for comparison to actual measurements in order to determine specific geological structures of the earth formations in a method that ensures accuracy by calibrating the system to desired parameters (column 1, lines 47-58 and column 9, lines 6-20).

Further, since the invention of Dubinsky does teach characterizing a formation with a logging tool based on both seismo-electromagnetic and electromagneto-seismic signals (Dubinsky; column 6, lines 5-15 and 36-17 and column 9, lines 33-

66), the combination would have performed the synthesis for each of the seismo-electromagnetic and electromagneto-seismic signals.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky in view of Tamarchenko and further in view of U.S. Patent No. 5,841,280 to Yu et al. and U.S. Patent No. 6,351,991 to Sinha.

As noted above, the invention of Dubinsky and Tamarchenko teaches many of the features of the claimed invention and while the invention of Dubinsky and Tamarchenko does teach generating synthesized seismo-electromagnetic and electromagneto-seismic signals based on inversion parameters, the combination is not explicit as to what constitutes the inversion parameters.

Yu teaches an apparatus and method for combined acoustic and seismoelectric logging measurements comprising means for calculating a synthetic seismoelectric signal (column 10, lines 31-33) based on inversion parameters of electrokinetic coupling coefficient (column 8, lines 32-36) and mobility (column 7, lines 39-42).

It would have been obvious to one having ordinary skill in the art to modify the invention of Dubinsky and Tamarchenko to specify the inversion properties of an electrokinetic coupling coefficient and mobility, as taught by Yu, because, as suggested by Yu, electriokinetic coupling and mobility are important parameters for properly modeling a seismic signal and, therefore, the combination would have improved the synthesizing and, consequently, the resulting determination of

formation characteristics in Dubinsky and Tamarchenko by setting such important parameters as initial values (column 7, lines 39-42 and column 8, lines 32-36).

As noted above, the invention of Dubinsky, Tamarchenko, and Yu teaches many of the features of the claimed invention and while the invention of Dubinsky, Tamarchenko, and Yu does teach generating synthesized seismo-electromagnetic and electromagneto-seismic signals based on inversion parameters of an electrokinetic coupling coefficient and mobility, the combination does not specify simplifying the synthesizing by synthesizing only slow longitudinal signals.

Sinha teaches determining stress parameters of formations from multi-mode velocity data including means for determining formation parameters by inversion (column 5, lines 10-15) to model transmission/reception seismic velocities (column 5, lines 16-27) wherein the modeling is simplified by synthesizing each of a plurality of modes individually, including a single mode of slow longitudinal signals (column 4, lines 5-9 and column 5, lines 28-49)

It would have been obvious to one having ordinary skill in the art to modify the invention of Dubinsky, Tamarchenko, and Yu to specify simplifying the synthesizing by synthesizing only slow longitudinal signals, as taught by Sinha, because, as suggested by Sinha, the combination would have improved the synthesis of Dubinsky, Tamarchenko, and Yu by providing individual synthesis per mode thereby reducing the complexity and, consequently, providing greater accuracy by reducing the chance of error (column 4, lines 5-9 and column 5, lines 28-49).

9. Claims 8, 10, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky in view of U.S. Patent No. 5,955,884 to Payton et al.

As noted above, the invention of Dubinsky teaches many of the features of the claimed invention and while Dubinsky does teach that the seismo- electromagnetic signal is a seismo-electric signal (i.e. measured using a hydrophone) (column 6, lines 35-48), that the electromagneto- seismic signal is a magneto-seismic signal (column 6, lines 5-15 – see also Woodward; column 1, lines 14-27 and column 3, line 64 to column 4, line 12), that the electromagnetic receiver is a magnetic receiver allowing to measure a seismo-magnetic signal produced by the acoustic wave within the formation (column 6, lines 5-15 – see also Woodward; column 1, lines 14-27 and column 3, line 64 to column 4, line 12), and that the electromagnetic emitter is a magnetic emitter allowing excite the formation with a magnetic exciting field (column 6, lines 5-15 – see also Woodward; column 1, lines 14-27 and column 3, line 64 to column 4, line 12), Dubinsky does not explicitly teach employing a system where the magnetic and electric transmission/reception are interchanged.

Payton teaches a method and apparatus for measuring transient electromagnetic and electrical energy components propagated in an earth formation comprising means for receiving a seismo-magnetic seismo- electromagnetic signal (column 8, lines 18-24) and/or an electro-seismic electromagneto- seismic signal (column 8, lines 24-29) and additionally teaches wherein an electromagnetic receiver is an electric receiver allowing to measure a seismo-electric signal produced by the acoustic wave within the formation (column 8, lines 9-43) and that the

electromagnetic emitter is an electric emitter allowing excite the formation with an electric exciting field (column 7, lines 28-53).

It would have been obvious to one having ordinary skill in the art to modify the invention of Dubinsky to explicitly teach employing a system where the magnetic and electric transmission/reception are interchanged, as taught by Payton, because, as suggested by Payton, the combination would have provided means for transmitting/receiving both electrical/magnetic signals as part of a TEM tool that, through the combination of the measured electric and magnetic signals interchangeably, is capable of determining a wider variety of characteristics of the formation (column 10, lines 7-28 and column 10, line 40 to column 11, line 3).

Response to Arguments

10. Applicant's arguments with respect to claims 1 and 3-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure:

U.S. Patent No. 4,894,808 to Pedley et al. teaches flow noise reduction comprising a hydrophone that measures an electric signal (abstract).

U.S. Patent Application Publication No. 2003/0151977 to Shah et al. teaches dual channel downhole telemetry.

U.S. Patent Application Publication No. 2002/0134587 to Rester et al. teaches a method, system and tool for reservoir evaluation and well testing during drilling operations.

U.S. Patent Application Publication No. 2005/0049792 to Yu et al. teaches real-time processing of multicomponent induction tool data in highly deviated and horizontal wells.

U.S. Patent Application Publication No. 2004/0128073 to Radtke et al. teaches formation evaluation through azimuthal measurements.

U.S. Patent No. 6,018,501 to Smith et al. teaches subsea repeater and method for use of the same.

U.S. Patent Application Publication No. 2002/0020533 to Tubel teaches a production well telemetery system and method.

U.S. Patent No. 6,177,882 to Ringgenberg et al. teaches electromagnetic-to-acoustic and acoustic-to-electromagnetic repeaters and methods for use of the same.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on (571)272-7925. The fax

phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrey R. West/
Primary Examiner, Art Unit 2857

January 23, 2009